

Anex

Bitfenix Formula Gold 650W

Lab ID#: 157
 Receipt Date: Aug 25, 2018
 Test Date: Sep 5, 2018

Report:
 Report Date: Sep 8, 2018

DUT INFORMATION	
Brand	Bitfenix
Manufacturer (OEM)	Channel Well Technology
Series	Formula Gold Series
Model Number	BF650G
Serial Number	
DUT Notes	

DUT SPECIFICATIONS	
Rated Voltage (Vrms)	100-240
Rated Current (Arms)	10
Rated Frequency (Hz)	47-63
Rated Power (W)	650
Type	ATX12V
Cooling	120mm Rifle Bearing Fan (DF1202512SEMN)
Semi-Passive Operation	X
Cable Design	Fixed cables

TEST EQUIPMENT		
Electronic Loads	Chroma 6314A x2 63123A x6 63102A 63101A	Chroma 63601-5 x2 Chroma 63600-2 63640-80-80 x10 63610-80-20
AC Sources	Chroma 6530, Chroma 61604	
Power Analyzers	N4L PPA1530, N4L PPA5530	
Oscilloscopes	Picoscope 4444 & 3424, Keysight DSOX3024A, Rigol DS2072A	
Voltmeter	Keithley 2015 THD 6.5 Digit	
Sound Analyzer	Bruel & Kjaer 2250-L G4	
Microphone	Bruel & Kjaer Type 4955-A, Bruel & Kjaer Type 4189	
Data Loggers	Picoscope TC-08 x2, Labjack U3-HV x2	

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RESULTS

Temperature Range (°C /°F)	30-32 / 86-89.6
ErP Lot 3/6 Ready	✓
(EU) No 617/2013 Compliance	✓

115V

Average Efficiency	88.674%
Efficiency With 10W (≤500W) or 2% (>500W)	0.000
Average Efficiency 5VSB	78.042%
Standby Power Consumption (W)	0.0446484
Average PF	0.988
Avg Noise Output	15.55 dB(A)
Efficiency Rating (ETA)	GOLD
Noise Rating (LAMBDA)	A+

POWER SPECIFICATIONS

Rail		3.3V	5V	12V1	12V2	12V3	12V4	5VSB	-12V
Max. Power	Amps	20	20	25	25	30	30	2.5	0.3
	Watts	100		650				12.5	3.6
Total Max. Power (W)		650							

HOLD-UP TIME & POWER OK SIGNAL (230V)

Hold-Up Time (ms)	19.3
AC Loss to PWR_OK Hold Up Time (ms)	16.2
PWR_OK Inactive to DC Loss Delay (ms)	3.1

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CABLES AND CONNECTORS

Captive Cables

Description	Cable Count	Connector Count (Total)	Gauge
ATX connector 20+4 pin (650mm)	1	1	18-22AWG
4+4 pin EPS12V (670mm+150mm)	1	2	18AWG
6+2 pin PCIe (570mm+150mm)	2	4	18AWG
SATA (500mm+150mm+150mm+150mm)	1	4	18AWG
SATA (500mm+150mm)+4 pin Molex (+150mm+150mm)	2	4 / 4	18AWG

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General Data	
Manufacturer (OEM)	CWT
Platform Model	GPS (Modified)
Primary Side	
Transient Filter	4x Y caps, 2x X caps, 2x CM chokes, 1x MOV, 1x CAP004DG
Inrush Protection	NTC Thermistor & Relay
Bridge Rectifier(s)	1x GBU1006 (800V, 10A @ 100°C)
APFC MOSFETS	2x Champion GP28S50G (500 V, 28 A @ 150°C, 0.125 Ohm)
APFC Boost Diode	1x STTH8S06D (600V, 8A @ 175°C)
Hold-up Cap(s)	1x Nichicon (400V, 680uF, 105°C, GG series, 2000h @ 105°C)
Main Switchers	2x Champion CMS6020
APFC Controller	Champion CM6502S & CM03X Green PFC controller
LLC Resonant Controller	Champion CM6901
Topology	Primary side: Half-Bridge & LLC Resonant Converter Secondary side: Synchronous Rectification & DC-DC converters
Secondary Side	
+12V MOSFETS	4x Intentional Rectifier IRFH7004TRPBF (40 V, 164 A @ 100°C, 1.4Ohm)
5V & 3.3V	DC-DC Converters: 2x UBIQ QM3006D FETs (30 V, 57 A @ 100°C, 5.5Ohm) 2x UBIQ QM3016D FETs (30 V, 68 A @ 100°C, 4Ohm) PWM Controller: ANPEC APW7159C
Filtering Capacitors	Electrolytics: Chemi-Con (105°C, KY series, KZE series) Polymers: FPCAP (Japan)
Supervisor IC	Sytronix ST9S429-PG14 (OCP [2x 12V channels, OVP, UVP, PG], Weltrend WD7518D (OCP [2x 12V channels], SCP) & UTC LM393G
Fan Model	Martech DF1202512SEMN (120 mm, 12 V, 0.37 A, 2000 RPM, Fluid Dynamic Bearing)
5VSB Circuit	
Standby PWM Controller	TinySwitch-LT TNY177PN (18W Peak)

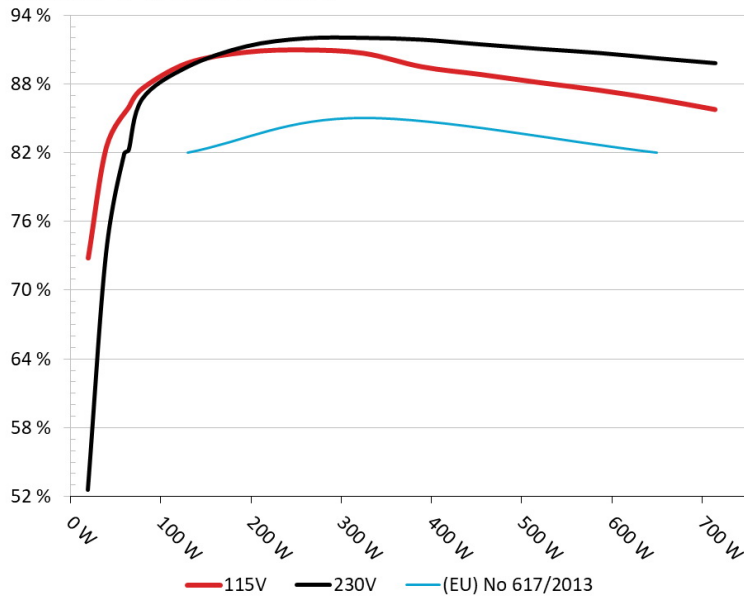
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EFFICIENCY UNDER HIGH AMBIENT TEMPERATURE

Efficiency: Bitfenix BF650G

Ambient: 37°C - 46°C (98.6°F - 114.8°F)



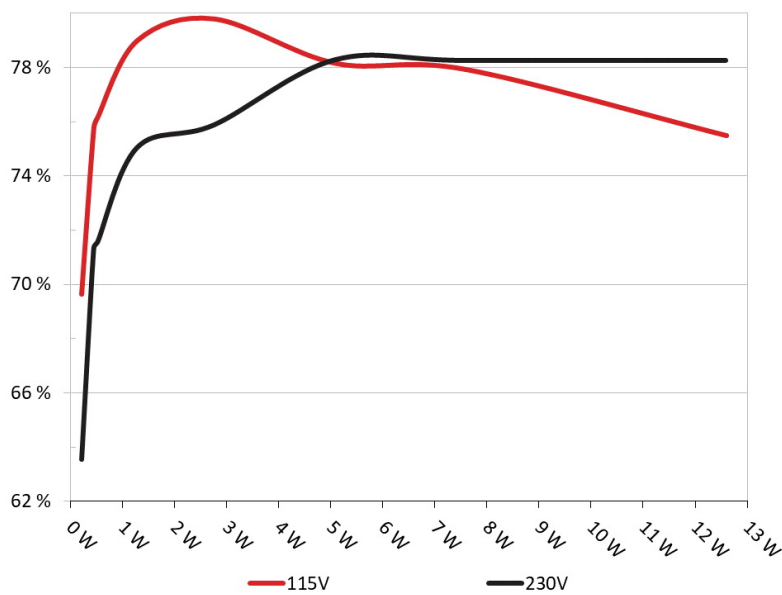
INFO

The PSU's efficiency under high ambient temperatures with 115V and 230V input. For this graph the results of the 10-110% load regulation table are used

5VSB EFFICIENCY

5VSB Efficiency: Bitfenix BF650G

Ambient: 34°C - 36°C (93.2°F - 96.8°F)



INFO

This graph depicts the efficiency levels of the 5VSB rail with 115V and 230V input

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5VSB EFFICIENCY -115V (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.041A	0.211	69.637%	0.031
	5.097V	0.303		115.15V
2	0.087A	0.443	75.726%	0.058
	5.096V	0.585		115.15V
3	0.542A	2.757	79.774%	0.268
	5.085V	3.456		115.15V
4	1.002A	5.083	78.140%	0.375
	5.074V	6.505		115.16V
5	1.501A	7.600	77.909%	0.431
	5.062V	9.755		115.15V
6	2.501A	12.595	75.478%	0.486
	5.036V	16.687		115.17V

5VSB EFFICIENCY -230V (ERP LOT 3/6 & CEC)

Test #	5VSB	DC/AC (Watts)	Efficiency	PF/AC Volts
1	0.041A	0.211	63.554%	0.010
	5.097V	0.332		230.46V
2	0.087A	0.443	71.337%	0.019
	5.096V	0.621		230.46V
3	0.542A	2.754	75.889%	0.104
	5.085V	3.629		230.46V
4	1.002A	5.082	78.293%	0.173
	5.073V	6.491		230.46V
5	1.501A	7.598	78.265%	0.234
	5.061V	9.708		230.46V
6	2.501A	12.591	78.268%	0.316
	5.035V	16.087		230.46V

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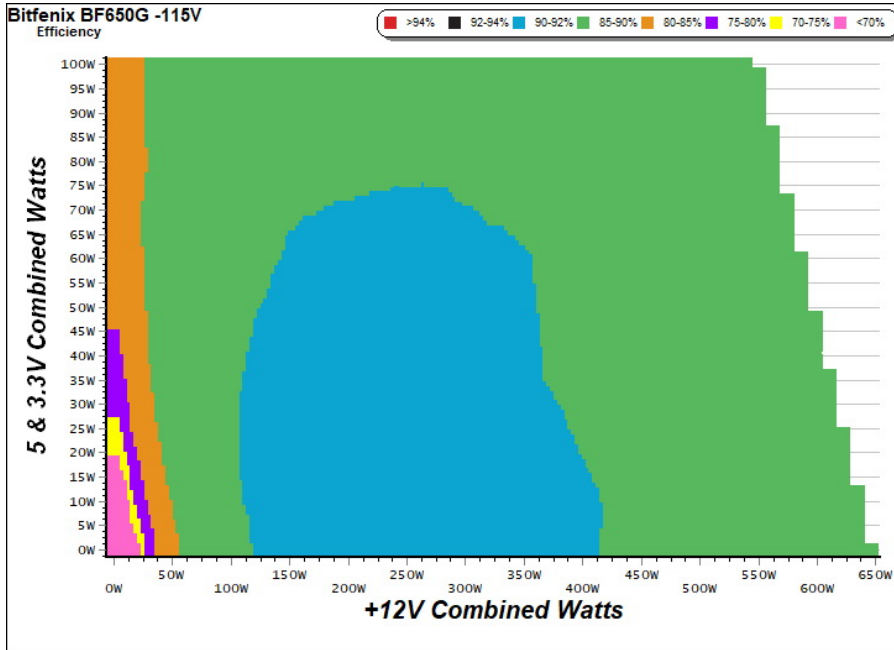
115V

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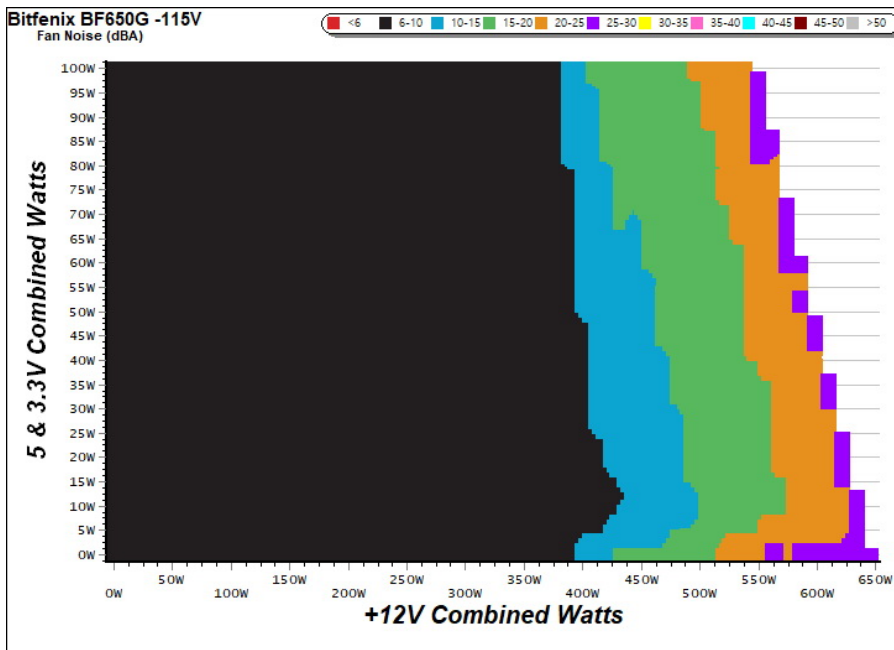
EFFICIENCY GRAPH 115V



INFO

This graph depicts the PSU's efficiency throughout its entire operational range. For the generation of the efficiency and noise graphs we set our loaders to auto mode through our custom-made software before trying thousands of possible load combinations

NOISE GRAPH 115V



INFO

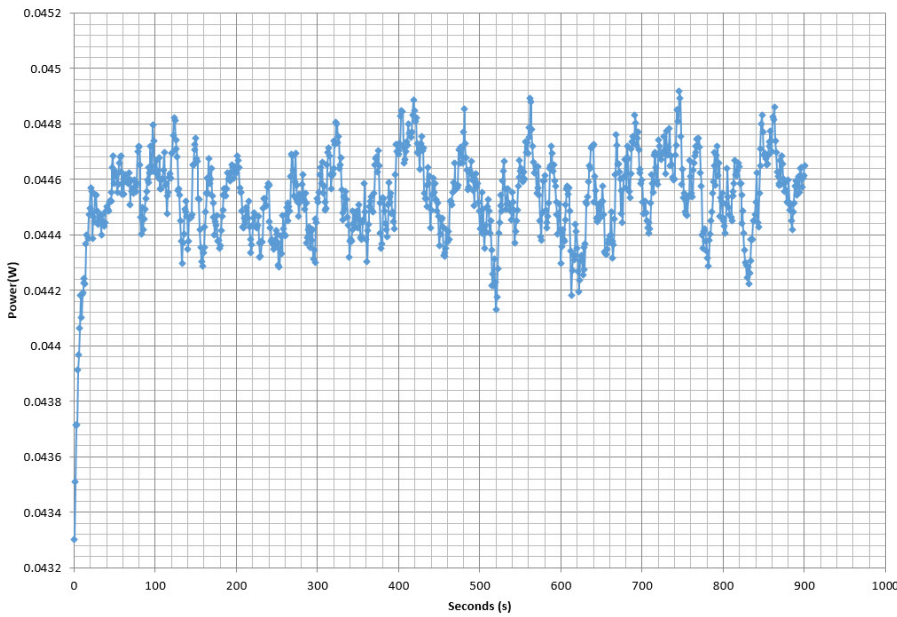
The PSU's noise in its entire operational range and under 30-32 °C ambient is depicted in this graph. The X axis represents the load on the +12V rail(s) while the Y axis is the load on the minor rails

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VAMPIRE POWER -115V

Power - - 08/08/2017 - 15:11



INFO

This graph is generated by the PPA Standby Power Analysis software which takes full control of the power analyzer during the whole procedure. This application features all of the EN50564 & IEC62301 test limits for standby power software testing

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10-110% LOAD TESTS 115V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	Fan Noise (dB[A])	Temps (In/Out)	PF/AC Volts
1	3.563A	1.975A	1.975A	0.985A	64.750	85.866%	480	9.6	38.48°C	0.965
	12.122V	5.055V	3.336V	5.062V	75.408				45.07°C	115.22V
2	8.164A	2.961A	2.964A	1.185A	129.702	89.826%	480	9.6	38.78°C	0.984
	12.111V	5.053V	3.334V	5.050V	144.393				46.51°C	115.21V
3	13.118A	3.467A	3.479A	1.385A	194.809	90.781%	480	9.6	39.57°C	0.989
	12.100V	5.050V	3.333V	5.038V	214.592				47.63°C	115.21V
4	18.076A	3.965A	3.956A	1.590A	259.706	90.973%	505	8.9	40.07°C	0.990
	12.089V	5.048V	3.331V	5.026V	285.477				49.81°C	115.20V
5	22.703A	4.960A	4.953A	1.795A	324.701	90.686%	505	8.9	40.82°C	0.992
	12.078V	5.044V	3.328V	5.010V	358.050				51.24°C	115.20V
6	27.334A	5.952A	5.950A	2.000A	389.640	89.498%	702	15.9	42.37°C	0.991
	12.068V	5.041V	3.324V	4.996V	435.360				53.42°C	115.20V
7	31.978A	6.953A	6.951A	2.204A	454.568	88.830%	948	24.2	43.00°C	0.991
	12.054V	5.038V	3.322V	4.984V	511.729				54.58°C	115.20V
8	36.633A	7.946A	7.950A	2.411A	519.512	88.129%	1220	31.9	43.85°C	0.992
	12.042V	5.035V	3.319V	4.970V	589.493				56.03°C	115.20V
9	41.728A	8.454A	8.471A	2.415A	584.600	87.476%	1515	37.0	44.48°C	0.993
	12.030V	5.031V	3.316V	4.965V	668.295				56.890°C	115.20V
10	46.783A	8.953A	8.953A	2.520A	649.424	86.693%	1799	41.7	45.33°C	0.993
	12.018V	5.029V	3.315V	4.953V	749.109				57.91°C	115.20V
11	52.236A	8.957A	8.959A	2.524A	714.419	85.777%	2043	44.7	46.20°C	0.994
	12.007V	5.028V	3.315V	4.947V	832.883				58.95°C	115.19V
CL1	0.096A	12.013A	12.005A	0.004A	101.561	84.019%	505	8.9	43.26°C	0.981
	12.112V	5.036V	3.322V	5.063V	120.879				56.26°C	115.22V
CL2	54.104A	1.004A	1.004A	1.001A	663.903	87.189%	1844	41.9	45.53°C	0.993
	12.023V	5.039V	3.326V	5.007V	761.453				57.28°C	115.19V

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20-80W LOAD TESTS 115V

Test #	12V	5V	3.3V	5VSB	DC/AC (Watts)	Efficiency	Fan Speed (RPM)	Fan Noise (dB[A])	PF/AC Volts
1	1.200A	0.495A	0.475A	0.195A	19.637	72.816%	480	9.6	0.848
	12.129V	5.057V	3.339V	5.089V	26.968				115.22V
2	2.431A	0.980A	0.986A	0.391A	39.710	82.483%	480	9.6	0.934
	12.125V	5.057V	3.338V	5.081V	48.143				115.21V
3	3.664A	1.477A	1.496A	0.590A	59.865	86.001%	480	9.6	0.961
	12.122V	5.055V	3.336V	5.073V	69.610				115.21V
4	4.882A	1.976A	1.975A	0.785A	79.718	87.615%	480	9.6	0.973
	12.119V	5.055V	3.336V	5.066V	90.987				115.21V

RIPPLE MEASUREMENTS 115V

Test	12V	5V	3.3V	5VSB	Pass/Fail
10% Load	12.7 mV	11.7 mV	7.3 mV	11.6 mV	Pass
20% Load	18.7 mV	13.0 mV	8.7 mV	13.2 mV	Pass
30% Load	22.4 mV	13.8 mV	9.5 mV	14.7 mV	Pass
40% Load	23.3 mV	14.3 mV	10.2 mV	15.8 mV	Pass
50% Load	25.7 mV	15.8 mV	9.3 mV	16.8 mV	Pass
60% Load	38.1 mV	71.0 mV	34.4 mV	17.3 mV	Fail
70% Load	30.2 mV	17.6 mV	11.6 mV	18.5 mV	Pass
80% Load	32.5 mV	19.1 mV	12.1 mV	31.3 mV	Pass
90% Load	34.8 mV	22.4 mV	22.3 mV	32.1 mV	Pass
100% Load	38.1 mV	25.2 mV	27.3 mV	27.3 mV	Pass
110% Load	38.6 mV	26.6 mV	27.3 mV	28.8 mV	Pass
Crossload 1	28.4 mV	14.6 mV	8.8 mV	11.4 mV	Pass
Crossload 2	30.6 mV	24.0 mV	29.2 mV	23.8 mV	Pass

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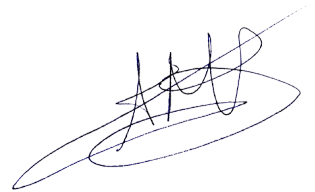


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Power specifications label

CERTIFICATIONS 115V

Aristeidis Bitziopoulos
Lab Director

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